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Chairside Diagnosis of Periodontal Diseases: A Review

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ABSTRACT

A good clinical diagnosis has always been the need of the hour. Proper diagnosis is essential for better treatment and planning of the diseases. Customary clinical estimations utilized for periodontal finding are regularly of restricted convenience as they are pointers of past periodontal illness instead of present disease action. Subsequently, there is a requirement for creating novel demonstrative kits that can identify dynamic diseases, anticipate future illness crisis or movement and assess reaction to periodontal treatment, and treatment encouragement in periodontal patients. In this futuristic era, there has been a tremendous amount of research in the field of diagnostic tools that can be utilized by a dental practitioners and even periodontists in their day to day practice. Distinctive chair side diagnostic kits will be discussed in this paper which will be useful for appropriate diagnosis, assessing the disease anticipation and proper treatment planning.

KEYWORD: *CHAIR SIDE TESTS, DIAGNOSIS, PERIODONTAL DISEASES, SALIVA*

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INTRODUCTION

Periodontitis is a set of provocative infections influencing the periodontium, i.e., the tissues that encompass and uphold the teeth. Periodontitis incorporate progressive loss of the alveolar bone, and at whatever point left untreated, can incite the loosening and subsequent loss of teeth. Periodontitis is caused by the microorganisms that adhere to and grow on the tooth's surfaces, accessible an over-aggressive immune response against these microorganisms.[1] An analysis of periodontitis is set up by investigating the soft gingival tissues around the teeth with a probe and by assessing the patient's X-ray films, to decide the amount of bone loss and the extend of periodontitis around the teeth.[2]

Diagnosis is the identification of any condition, disease, or disorder due to any methodical investigation of the history, assessment of the signs or symptoms, and examination of the study results. Successful prognosis is preposterous without a viable diagnosis.[3] Similarly, a "Periodontal Diagnosis" is a significant label that a clinician ties on the periodontal disease state of the patient, capturing all his previous involvement in the condition. The grouping of signs and side effects, alongside a detailed history is evoked, reported and deciphered to reach at a determination. Frequently an exact analysis is, the absolute first solid advance step towards the arrangement and execution of an individualized treatment plan, contributing essentially towards the achievement of the treatment.[4]

It is moderately simple to recognize anatomical damage, caused by advanced stage of periodontitis with symptomatic guides. On the other hand, incipient disease identification fills in as a test in any event, for the most experienced clinician. Accentuation on early discovery fills in as a drive for dealing with the illness with negligibly intrusive and financial helpful modalities.[5] Consequently, there is a requirement for creating novel indicative units that can identify dynamic infection, anticipate future illness crisis or movement and assess reaction to periodontal treatment, treatment encouraging administration of periodontal patient. The accessible chair side indicative units are intended to quantify microbiological, immunologic and hereditary constituent in oral analytic liquids such as saliva or gingival crevicular fluid, which can be an indicative of the diseases.[6]

The main aim behind the emergence of different diagnostic tests is that the previous active dynamic disease is analyzed, the less intrusive, the less time devouring and therefore the less expensive the required treatment and the better long haul visualization for patients with damaging disease.[7]

IDEAL CHARACTERISTICS OF A DIAGNOSTIC KIT[8]

1. Quantitative.
2. Exceptionally delicate strategy fit for investigating a single periodontal site in wellbeing just as disease.
3. Reproducible and amendable for chair side use.
4. Exceptionally explicit.
5. Easy to perform and Versatile.
6. Rapid, one or two stage technique.
7. Non-obtrusive and Affordable.

Different specialized challenges in conventional techniques from sample taking to dispersion, cultivation, characterization, and identification of isolates and issues related with sufficient investigation of microbiologic information makes regular symptomatic techniques time consuming and cumbersome.[1] In this context chairside periodontal diagnostic kits provides a quick reports.

These diagnostic kits can be characterized as Biochemical kits, Genetic kits and Microbiological kits.

BIOCHEMICAL KITS

Biochemical test units utilized in periodontics investigate the gingival crevicular liquid (GCF). Since this liquid is retrieved from periodontal tissues, assessing its constituents, like inflammatory mediators, host derived enzymes and extracellular matrix components may give early indications of changes. Kits included are:

Perio-Check (Ac Tech): has 88% sensitivity and 61% specificity. It is the most rapid chair side test for neutral proteases like collagenases in GCF. The degrees of these proteins in GCF have been noted to increment with the advancement of gingival disease as well as development of established periodontitis. Interproximal areas can't be inspected because of the risk of saliva contamination.[9]

PerioGard ™: depends on the estimation of protein level, aspartate aminotransferase (AST) in GCF. The test is intended to be positive at >800 μIU of AST activity and negative at values less than 800 μIU. One of the major disadvantages of periogard is that it cannot distinguish between sites with severe inflammation but with no attachment loss from sites with attachment loss.[10]

PocketWatch™: method is use to analyze AST at the chairside. It is conceivable to distinguish between dynamic and latent sites. AST action dictated by PocketWatch™ provides not only an index of cell death but the degree of the destructive pockets.[11]

Prognos-Stik (Dentsply): This framework recognizes the presence of serine proteinase elastase in GCF sample.[10]

Perio2000: framework is planned so that it consolidates the highlights of a periodontal test with

the measurement of probing depths, to evaluate bleeding on probing and recognition of unpredictable sulfur mixes in the periodontal pocket. Sulfide sensor component is employed with traditional techniques within the evaluation of periodontal diseases in patients.[12]

Dip Stick Test: The MMP-8 test stick depends on the immune-chromatography rule that utilizes two monoclonal antibodies explicit for various epitopes of MMP-8. The test stick results can be distinguished in 5 minutes. The antibody identifies the two neutrophils and non-PMN-type MMP-8 isoforms.[13]

TOPAS (Toxicity Prescreening Assay): distinguishes the indirect presence of microorganisms by two markers of gingival contamination: bacterial toxins and bacterial proteins. This test can be related with the severity of inflammation and with the advancement of destructive process making the contrast between an active and a latent periodontal disease.[14]

Oral Fluid Nano Sensor Test (OFNASET): is a miniature electromechanical framework based on electrochemical detection platform that is capable of real time, ultrasensitive, ultra specific multiplex recognition of salivary protein and RNA biomarkers. OFNASET is utilized for the purpose of care multiplex recognition of salivary biomarkers for oral malignant growth. It analyses saliva for the presence of four salivary mRNA biomarkers (SAT, ODZ, IL-8, and IL-1β) and two salivary proteomic biomarkers (thioredoxin and IL-8).[12]

Integrated Micro fluidic Platform for Oral Diagnostics (IMPOD): A clinical point of care diagnostic test empowers fast evaluation of an oral disease biomarkers in human saliva by utilizing a solid dispensable cartridge intended to work in a conservative diagnostic instrument. Quickly (< 10 min) measures MMP-8 in saliva from healthy and periodontally diseased subjects.[15]

Electronic Taste Chips (ETC): They are synthetically sensitized bead microreactors inside the lab-on-a-chip framework and were applied for estimation of CRP and other biomarkers of inflammation in salivation. With this procedure it was conceivable to quantitate the distinction in CRP levels between healthy and patients with periodontal infections and can simultaneously screen several biomarkers.[15]

GENETIC TEST KITS

Different gene polymorphisms are viewed as risk factors for the inception or movement of periodontal infection. Kornman et a (1997), found a relationship between the polymorphism in gene encoding for interleukin-1α and interleukin-1β and increased severity of periodontitis. Although genetic identification is a difficult procedure and requires an experienced hand, however some chairside units are now accessible for its recognition.[16]

MyPerioID: test utilizes saliva to decide patient's genetic susceptibility to periodontal disease and which patients are at higher risk of more serious periodontal diseases.

PST Genetic Susceptibility Test: It assesses the concurrent event of allele 2 at the IL-1A +4845 and 1B +3954 loci that identify individual's predisposition for the expression of inflammation and risk for periodontal diseases.[5]

MICROBIOLOGICAL TEST KITS

Counting and Identification of the microflora in periodontal pocket have been a significant piece of exploration endeavors for a long time. It is assumed that atleast of 300 particular bacterial species can repress the periodontal pocket. A large number of these have not been recognized. The microbiological tests can possibly uphold the finding of different types of periodontal infection, to fill in as pointers of disease commencement and progression and to figure out which periodontal sites are at higher risk for dynamic annihilation. These tests mostly focused on spirochetes, Aa, Pg and Pi.

Evalusite (Kodak): It is a novel membrane immunoassay monetarily accessible in Europe and Canada for the Chairside identification of 3 periodontal microbes. It includes linkage between the antigen and a layer bound neutralizer to frame an immunocomplex that is uncovered through a calorimetric response. Membrane bound antibody response in the well explicit to A.actinomycetemcomitans, P.gingivalis and P.intermedia responds with plaque sample.[17]

OMNIGENE (DMDx): A. actinomycetemcomitans cloned test and P gingivalis entire genomic test involve the basis of the commercial DMDx identification strategy. For P. gingivalis, the DNA test examine can give a false negative data.

Steenbergen et al found the DMDx identification technique to have 96% affectability and 86% particularity for spiked lab examples of A. actinomycetemcomitans and 60% affectability and 82% particularity for lab examples of P.gingivalis.8 However, in clinical specimens a reverse scenario is seen.[17]

PERIOSCAN: with 99% sensitivity and 55% specificity is a chair side diagnostic measure that recognizes an accumulation of periodontal microbe's B. forsythus, P. gingivalis, T. denticola and certain Capnocytophaga species that produce trypsin like enzyme by using BANA. It cannot recognize the presence of different microorganisms that don't produce trypsin like catalyst. The outcomes are subjective and depend upon the administrator's appraisal at the calorimetric end point. The particular microscopic organisms that are answerable for chemical creation can't be determined. This BANA test is extremely delicate, identifying even minute amounts of microbes. The test can also be utilized for evaluation of oral halitosis, to recognize the presence of two BANA positive species on the tongue surface: Stomatococcus mucinlagenous and Rothia dentocariosa.[9]

IAI PADO TEST 4.5: With the PADO RNA probe test unit, four periodontal microbes can be recognized: A. actinomycetemcomitans, P. gingivalis, T. forsythia also, T. denticola. This test utilizes oligonucleotide probes corresponding to moderated pieces of the 16S rRNA quality that encodes the rRNA, which structures a subunit of the bacterial ribosome. The discovery frequencies discovered showed a low affectability of the PadoTest 4.5 technique contrasted with the checkerboard strategy. The PadoTest 4.5 appears to disparage the quantity of positive sites recommended by a high number of false negatives.[18]

My PerioPath: utilizes a saliva test to recognize the sort and centralization of the particular microbes that cause periodontal disease. This test requires the transportation of saliva tests to a research center for results.[12]

DNA probes: these are very specific and are utilized to decide phenotypic marker and has an extraordinary specificity and sensitivity. These are single stranded pieces of nucleic acid, marked with a particular tracer that will hydrogen bond with integral single stranded piece of DNA or RNA under the appropriate conditions of pH, temperature and notorious quality. DNA tests deal with the guideline of the DNA base sequencing. The reciprocally of DNA is in view of the hydrogen holding between the bases adenine and thymine, and guanine and cytosine, separately.[19]

Microprobe Corporation: It is planned as an in-office nucleic acid test measure for the semi quantitative location of periodontal microbes. The bacterial cells in subject's plaque samples are lysed by warming within the sight of detergent. The extracted DNA is then positioned in to the first well of multi-well cassette and afterward positioned into a machine with a programmable mechanical arm which shows computerized current bacterial load.[19]

CONCLUSION

In any branch of medical field, the success of treatment entirely depends upon the accuracy of diagnosis. Recently, in periodontology chronic periodontitis cases can be managed accurately by using existing diagnostic methodologies, in spite of the fact that it is obviously more alluring to have the option to analyze "dynamic infection" when it happens, as opposed to months after the fact. Chair side diagnostic test kits offer fast, reproducible method of diagnosis and the outcomes can be utilized for persistent inspiration too. They are helpful particularly in making out the active sites and observing patients post treatment for assessing the reaction to treatment and disease recurrence. Incorporating new salivary indicative techniques to clinical practice is critical to help dental experts in making basic wellbeing related choices for patients.

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